



GNSS Curriculum for Master's degree and Views of ICG Information Center

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Working Group C

Recommendation 1: Add a new action to the workplan of the working group: **Action C5: Education and training programmes on GNSS**

Recommendation 2: Suggest an additional view on **Education curriculum on GNSS**

Provider's Forum

Proposed to explore among the Providers the idea of establishing ICG **information centers** out of the current UN' affiliated regional space science and technology education centers.



- Education Program **(MASTA)** on GNSS
- 9-Monthes Curriculum of GNSS
- Views of ICG Information Center
- Conclusions

1 MASTA Program on GNSS

MASTA:

MAster degree program in
Space Technology and
Applications

Followed by the guideline of the scheme of peaceful use of space technology and application which proposed by the Resolution of the United Nations in 1990s.

Space Technology Applications

United Nations Education Curricula



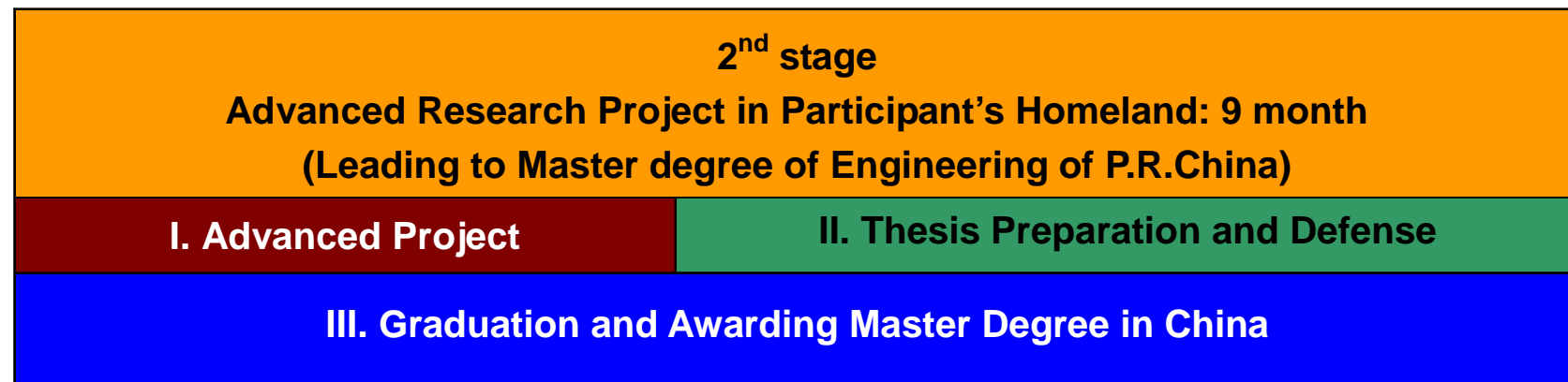
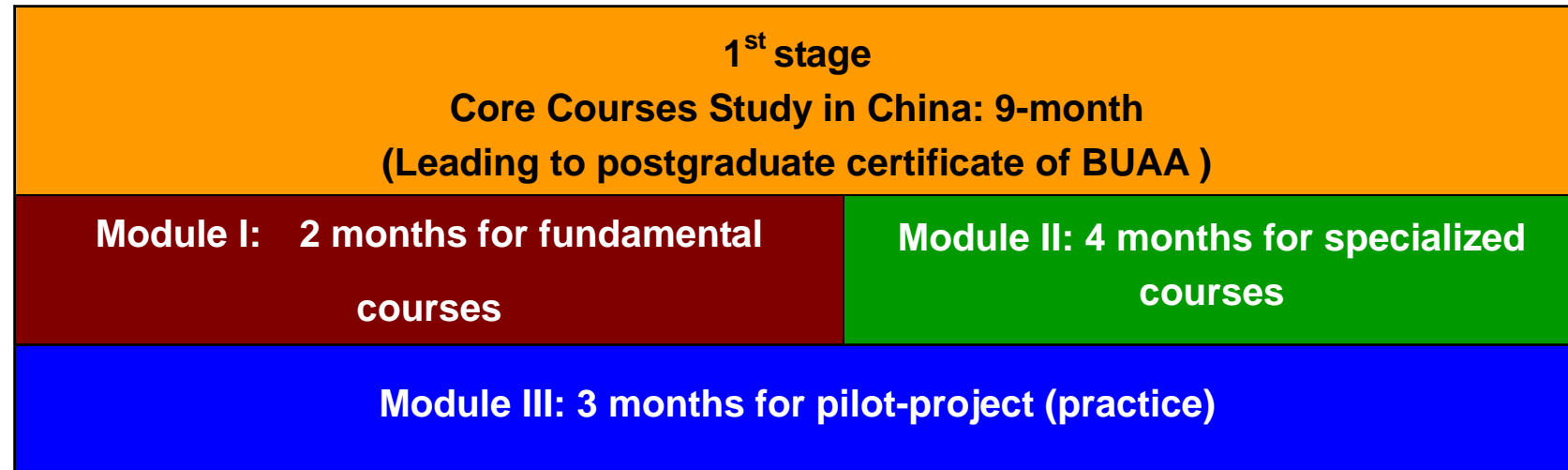
Education curricula and education modules have been and are being developed for

- **Remote Sensing and Geographical Information Systems**
- **Satellite Communications**
- Satellite Meteorology and Global Climate
- Space and Atmospheric Sciences as well as data management
- **Space Law, GNSS**

Characteristics of MASTA

- **Complied with international conventions**
 - ◆ *Two phases: course study and project*
 - ◆ Totally new structure for graduate program in China
- **Engineering and Application oriented**
 - ◆ *Comprehensive and Extended experiments and practice*
 - ◆ Meet the general requirement of space science and technology
- **Modularized Curricula Design**
 - ◆ *Tailor-nade for different requirements*
- **Flexible study modes**
 - ◆ *Complete the research project at homeland/or at Beihang*
 - ◆ *Flexible project duration*
- **Striking Chinese features in space technology applications**

Duration and Schedule



In October, 2004, **Master degree program in Space Technology and Applications(MASTA)** was authorized by the Minister of Education, China, **which is the first and only one specialty program arranged its education curriculum according to the UNOOSA in china.**

MASTA Program Outlook

Year	Directions	Number	Country	Sponsors	Partners
2006	RS and GIS	14 + 4	7+1	Space Agency, APSMCS	Space Agency
2008	RS and GIS	11	4	CSC	
2008	STCOM	10	1	CLTC	
2010	RS and GIS	11+1	5+1	CSC Special Program	
2011	SACOM	16	9	CSC Special Program	
2012	GNSS			CSC Special Program	

9-Monthes Curriculum of GNSS

Module 0: Orientation (1st Week)

No.	Item	Type
EC1	Training Program Interpretation	Orientation course or information will be arranged in the 1 st Week
EC2	Meeting with the Course Studying Director	
EC3	Preparing Teaching Material	
EC4	Seminars	
EC5	Professional Visits	
EC6	Culture Visits	
EC7	Serious Lectures I : Communications Skills	
EC8	Serious Lectures II : Advanced Space Research and Technology Development in China	
EC9	Extracurricular Laboratory Practices	
EC10	Extracurricular Teaching Assist	
EC11	Scientific Literature Reading	
EC12	Course Progressing Evaluation	

9-Monthes Curriculum of GNSS

M I : Platform Curriculum (2 Months)

M I -1: Mathematics for Space Science and Engineering

Code	Title	Class Hrs	Credits	Type
PC1-1	Probability and Statistics	48	3	Select one of them.
PC1-2	Linear Algebra	48	3	
PC1-3	Numerical Analysis	48	3	

M I -2: Computer

Code	Title	Class Hrs	Credits	Type
PC2-1	Computer Laboratory (1): Matlab Programme	48	3	Select one of them.
PC2-2	Computer Laboratory (2): C and C++Programme	48	3	

M I -3: Space Views

Code	Title	Class Hrs	Credits	Type
PC3-1	Space Environment, Orbit and Spacecraft Systems	48	3	Compulsory
PC3-2	Introduction to Space Law	18	1	Elective
PC3-3	Space Technology and Space Economy	18	1	Elective

M I -4: Chinese Culture

Code	Title	Class Hrs	Credits	Type
PC4-1	Introduction to China and Chinese Language	54	3	Compulsory

9-Monthes Curriculum of GNSS

Module II : Specialty Curriculum

Module II-1 Fundamental Specialty Curriculum (8 weeks)

Code	Title
FSC2-1	GNSS Reference System
FSC2-2	Principle of Global Navigation Satellite Systems
FSC2-3	Navigation signal Simulation and Test Technologies
FSC2-4	GNSS Receiver Principles and Design
FSC2-5	GNSS/INS Intergration Navigation Principle and Technologies

M II-2 Advanced Specialty Curriculum (6 weeks)

Code	Title
ASC2-1	Satellite Navigation Applications
ASC2-2	Satellite Navigation Data Processing
ASC2-3	GNSS Experiment
ASC2-4	GNSS New Technologies and Applications

GNSS Education Curriculum (Version 2)

Module1: Introduction

Module2: Basic techniques of communications and navigation

Module3:Technogies:GNSS primary systems

Module4:Technogies:Augmented systems

Module5:Receivers

Module6: Applications

Module7:Laboratory experiments, field visits, project work

32	2	Compulsory
32	2	Compulsory
18	1	Compulsory
12	1	Compulsory



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9-Monthes Curriculum of GNSS

Module III: Pilot Project (3 months)

Module III-1: Team Project

Code	Title	Class Hrs	Credits	Type
TP	Project organized by BUAA	10 Wks.	5	Select one of them.
TP	Project organized by other institute	10 Wks.	5	

MIII-2: Personal Pilot Project

Code	Title	Class Hrs	Credits	Type
PP	Pilot Project		3	Compulsory
PP	Advanced Research Project Proposal/Master's Degree Thesis Proposal		1	Compulsory

3 Views of ICG Information Center

The concept of “information center” can be small or big. For my understanding, it is hard to work out a well definition of ICG information center in current situation.

We noted that the “**ABUJA ISWI RESOLUTION**” of UN/Nigeria Workshop on the International Space Weather Initiative, 17-21 October 2011

So, in this case, an **International center for GNSS science, technology, and education** should be take into consideration.

It will be given full scope to the initiative and creativity of the interested nations/universities/institutions.

International center for GNSS Science ,technology, and education

1. The United Nations should lead, with the active support and an international effort.
2. This Centre should grow into a network of national and regional centers, focusing on GNSS , around the world – all dedicated to advancement of GNSS research and education.

International center for GNSS Science ,technology, and education

3. The Centre would provide Capacity Building and technical guidance to nations that wish to engage in GNSS technology , application and education. Capacity Building consists of three main components:

- Laboratories on GNSS
- Distant Learning/Video Conference System/environment
- Education/training Program on GNSS technology and application

A proven record of capacity building is an essential prerequisite for this center.

International center for GNSS Science ,technology, and education

4. The Centre must be a university/institution with a proven record in organizing international activities. These activities include GNSS schools, GNSS workshops, GNSS Seminar, GNSS degree program, and international outreach program. The Centre must possess experience in promoting and supporting international program such as RS &GIS,STCOM, GNSS, etc.
5. The Centre would cooperate with the UN-affiliated Regional Centres for Space Science and Technology Education, located in India, Mexico/Brazil, Morocco, and Nigeria, and other centres of excellence in space science and technology education.

Collaborate with the leading GNSS product and service providers

*Mutual benefits,
All-win,
Sustainable Development*

Construction mode (UGIU Mode)

- **U**NOOSA Supervise (lead)
- **G**overnment /Agency Support 
- **I**ndustry/ Intuitions Participate



- **U**niversity located



Education Affairs

- Pursue to quality education cooperate with world class professors/instructors and characteristic curriculum/course
- Take full use of ICT technologies to establish a distance learning environment and facilitate teaching recourses sharing and reduce costs and benefit for more people.

Education Affairs

Education and Training Programs

- (1) Master degree program on GNSS
- (2) Senior training program for management
- (3) Senior training program for professional
- (4) Fundamental program on GNSS
- (5) Practical program on GNSS
- (6) Distance learning classes on GNSS
- (7) Seminars on GNSS
- (8) **Summer school on GNSS**

With various level for beginner and Professionals

Teaching and Practice

To Establish a Teaching and Practice Lab of GNSS at Beihang University.

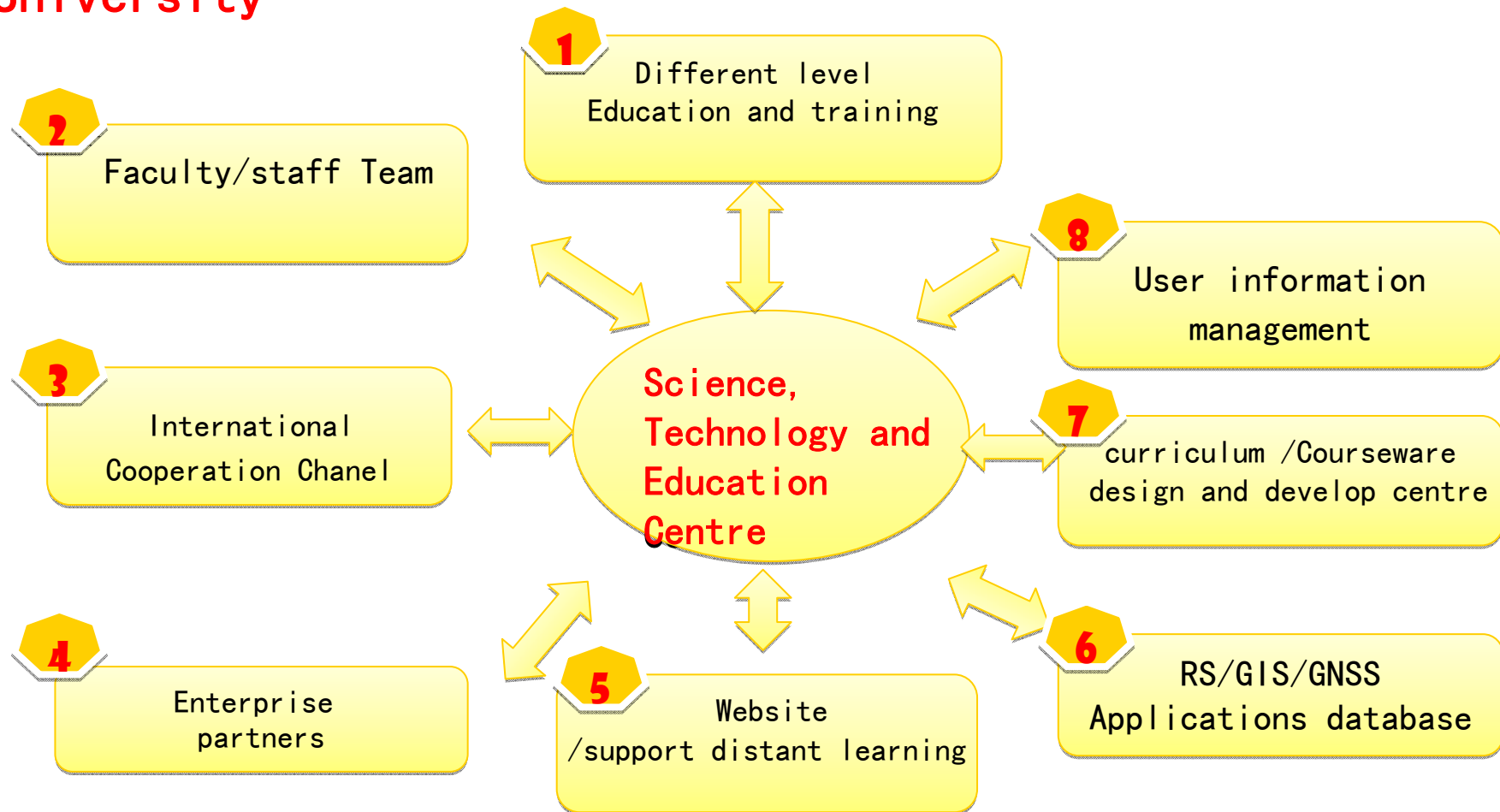
Collaborate with the leading enterprises of GNSS and provide more opportunities or chances for students to improve their practice skills and broaden their horizons.

Students Service

Provider quality service to the students

Collect user's feedback to all GNSS systems in each education program. A student is a user of GNSS as well a tester.

The International Centre is available at Beihang University



3S Integrated in very necessary and important



RS

GIS

GNSS

"3S"

**Integrated,
network sharing**



Distant Education/Learning Model Classroom

Capacity Building



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Conclusions

- 1) We proposed that add one more module of GNSS data processing to the GNSS Education Curriculum version 2.
- 2) GNSS providers should take more responsibility for disseminating GNSS information and facilitating GNSS awareness. As we noted that GNSS providers have more experience, resources in GNSS applications, and are geographically distributed throughout the world to take advantage of this.
- 3) We suggested that establish an international center for GNSS Science, Technology ,and Education can be take into consideration . With the development of our MASTA program and education capacity building in recent years, such kind of center now is available at Beihang University.



*Thanks
For Your Attention!*